

# PARTS NEWS

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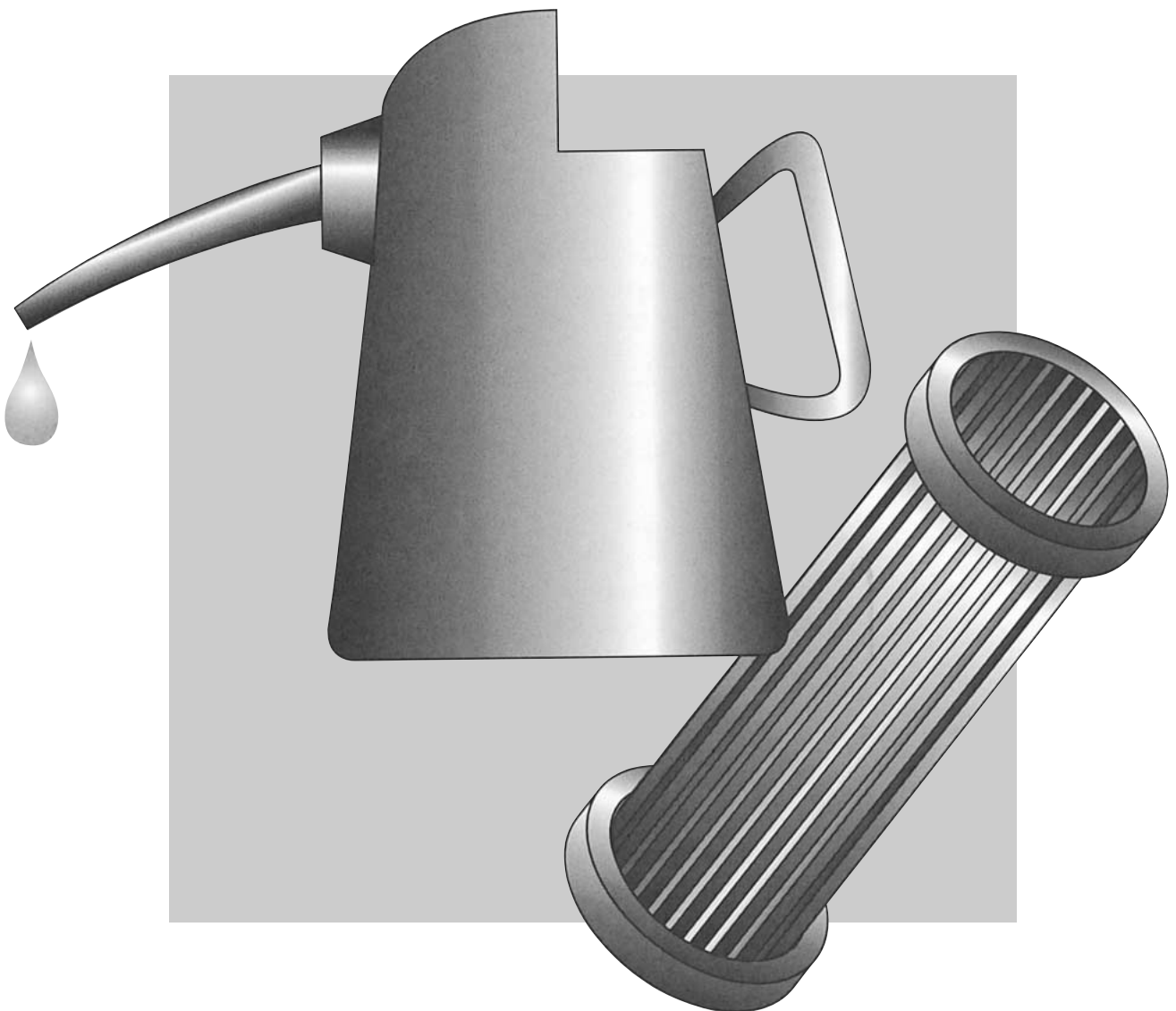
PN05-001

Issue date:

September 30, 2005

Subject: **Importance of Oil and Oil Filter Service**

Purpose: This Parts News is intended to provide you with the important information regarding regular oil and filter change including each function, which you are obliged to give a convincing explanation to your dealers and customers so that your customers can satisfactorily use their forklifts always operating at peak performance in tiptop shape for a long period of time.



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**Komatsu Forklift Co.,Ltd.**

Customer Support Dept. International Div.

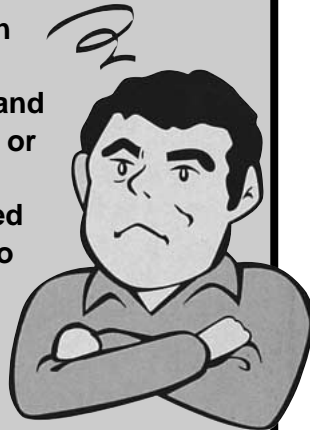
2-3-4, Akasaka Minato-ku, Tokyo

# Why you should change engine oil and

1

**Can you promptly reply to any simple questions from your customers?**

- “What is the reason my forklift should change engine oil and filters every month or every 200 hours? Even you don’t need oil change for six to twelve months in driving a truck!”



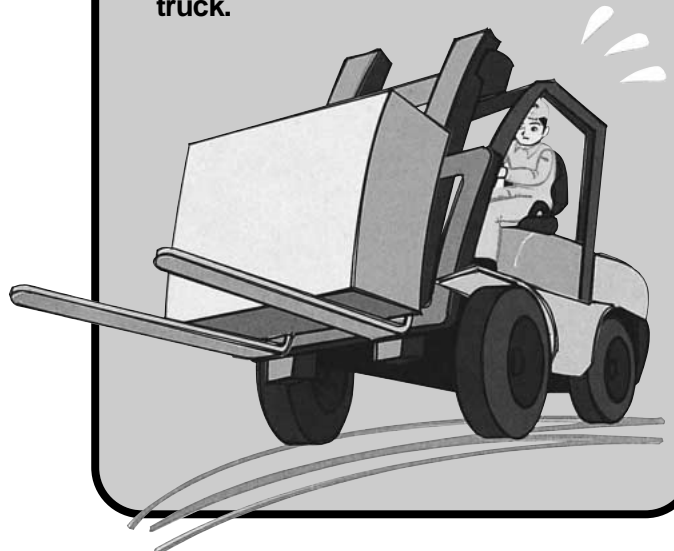
- Have you ever received a question like this from your customer before? You should be prepared to such a simple question with your clear response convincing customers who appreciate to say, “Oh, I see. Now I understand your point.” Otherwise, you may lose your important customers very easily.



2

**Forklift operates under very severe applications**

- Anyway, there is a huge difference between forklift and truck regarding applications and load conditions.
- If you compare the vehicles equipped with almost the same capacity engine, the service weight of forklift is much heavier than truck and the rated capacity is bigger than the loading capacity of truck by about 50 %. Moreover, the frequency of load changes is incomparably high in the operation of forklift repeating loading and unloading, lifting up and down to traveling on isles of job site.
- Therefore, it is quite natural that not only engine oil and hydraulic oil but also filter element or air cleaner of forklift deteriorate much faster than truck.

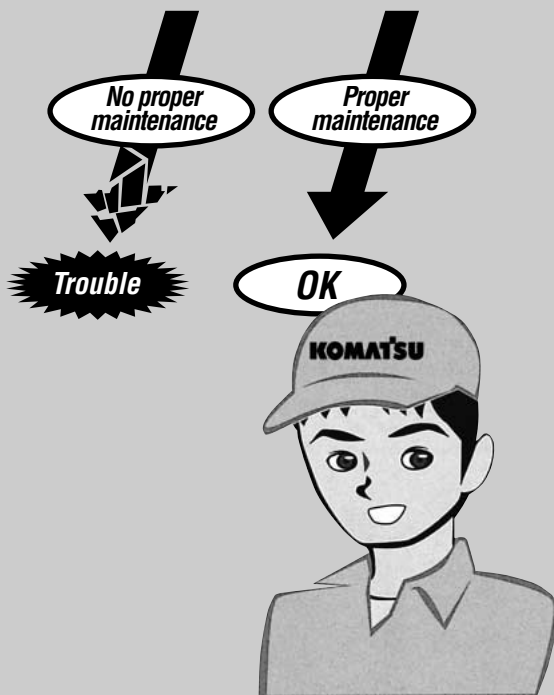


# filters every 200 hours?

**3**

Therefore, it is important to observe recommended replacement interval.

- Those customers you haven't been getting in touch for a long time might not observe your recommended service interval, which could lead to some engine problems.
- Missing regular maintenance won't be advantageous to your customers but may adversely affect to your sales strategy afterward in the wake of losing reliance on Komatsu products, even if the problem is attributable to customer's to provide proper maintenance.



**4**

It is important for your customer to learn difference of load conditions.

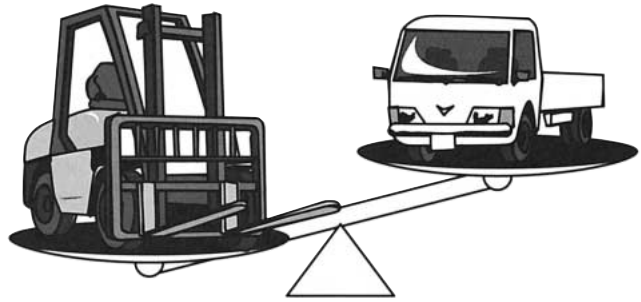
- Not all customers understand every severe load condition in forklift applications. The fact is that many customers rather think forklift is the similar vehicle to passenger car or truck.
- It is one of your important duties to giving a convincing explanation to your customers about the difference of load conditions between forklift and passenger car or truck correctly.
- Convincing your customers about inevitability of periodic oil change sure will lead to win customer's trust so that you will be able to provide your customer with professional monthly inspection and maintenance service with the best of your capability.



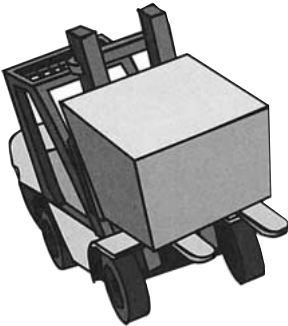
# Examples to show a huge difference

## Service weight is extremely different even with similar engine power!

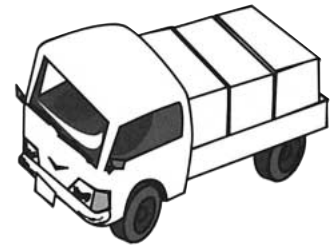
The structure of forklift body is strong enough to hold a heavy payload. Also, forklift is equipped with a heavy counterweight, which means service weight is extremely heavier than truck. Consequently, the engine of forklift needs all its strength to maneuver even at the time of carrying no payload.



## Weight of payloads for lifting or loading is extremely heavy, too!

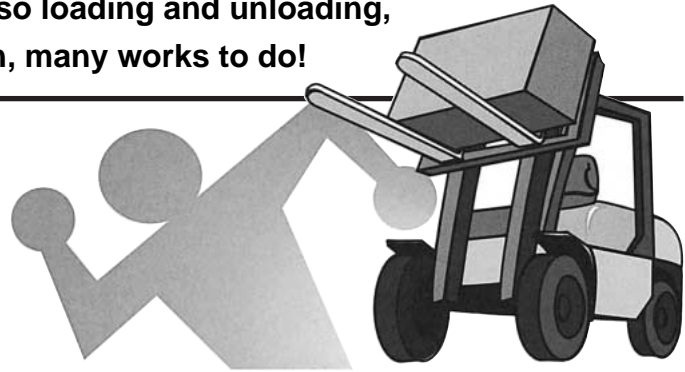


Comparing with forklift and truck equipped with engine of the same class, you can see the rated capacity of forklift or the loading capacity of truck is extremely different. Refer to the comparison table on page 5. As for forklift, in addition to the service weight, the weight of payloads is also extremely heavy. Therefore, the burden on engine should be enormous.

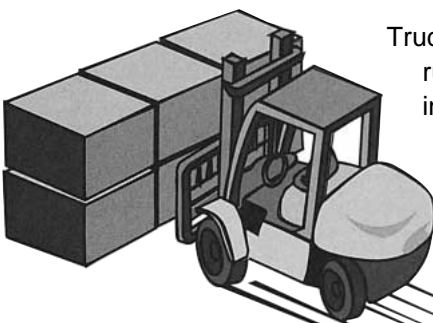


## Not only traveling but also loading and unloading, lifting up and down, many works to do!

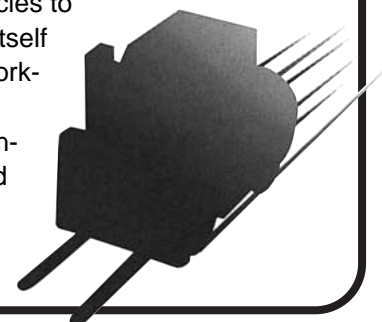
Truck runs only for delivery once loading payloads. As for forklift, repeating big load changes—from no load to loaded condition, lifting cargo up and down, which is a heavy burden for engine just like the beating of the heart of an athlete continuing to exercise an interval training.



## Busy in maneuvering at a limited space—that's certainly a tough job!



Truck just runs on the "road" built only for vehicles to run. On the other hand, forklift keeps busy itself in maneuvering at a limited space on the working site including factory and warehouse under various applications and load conditions repeatedly traveling forward and reverse—working like a beaver. That's certainly a tough job!



# between forklift and truck

## Compare forklift with truck on how does it work a day:

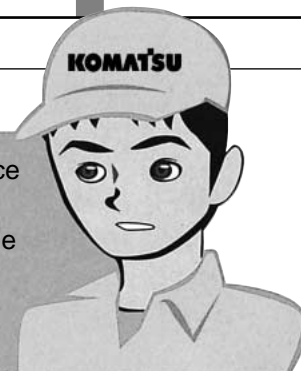
You can see forklift works away in repeating various operations including traveling and material handling with frequent changes in load conditions, while truck runs in relatively constant load conditions for the most part

	Forklift	Truck
Frequency of stop-and-go driving	Repeating frequently.	Only at the red light except traffic jams.
Frequency of forward and reverse directional changes	Repeating frequently.	Not so often: mostly when taking truck into the garage.
Frequency of gear changes	Repeating frequently.	No gear change traveling at constant speed.
Frequency of load changes between loaded and unloaded	Repeating frequently.	No load changes during traveling until unloading after loading payloads.
Frequency of steering wheel turning	Repeating frequently.	Not so often: mostly when taking truck into the garage.
Acceleration from average throttle opening degree	Mostly in full throttle.	Mostly at half throttle traveling at constant speed.

## Compare specifications between forklift and truck:

Here is the comparison of specifications between forklift and truck equipped with the same ISUZU 4JG2 engine—in different engine setting—as shown below. Now, you can see forklift drives its extremely heavy body and handles greatly heavier payloads than truck.

	Forklift	Truck
Model	Komatsu FD30H-12	ISUZU ELF KK-NKR69EA (2 ton)
Engine	ISUZU 4JG2*	ISUZU 4JG2
Piston displacement	3059cc	3059cc
Rated output	70ps/2400rpm	94ps/3600rpm
Maximum torque	21.7kgm/1800rpm	20.6kgm/1800rpm
Service weight	4320kg	2060kg
Rated capacity (loading capacity)	3000kg	2000kg
Oil capacity (engine oil pan)	7.5 ℓ	7.5 ℓ



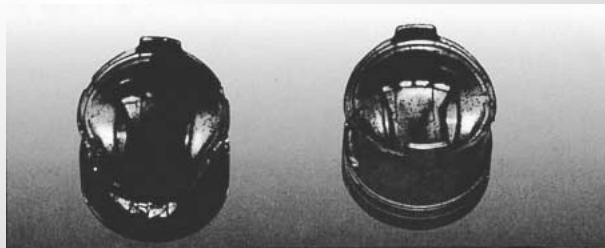
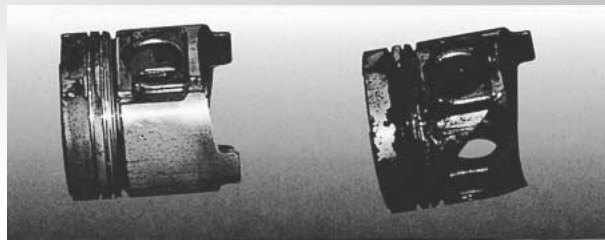
"There is such a huge difference in service weight and loading capacity even equipped with the same engine. That's why the engine of forklift starts wearing much faster."

# To prevent engine parts deterioration like this—visual examples:



## Engine oil

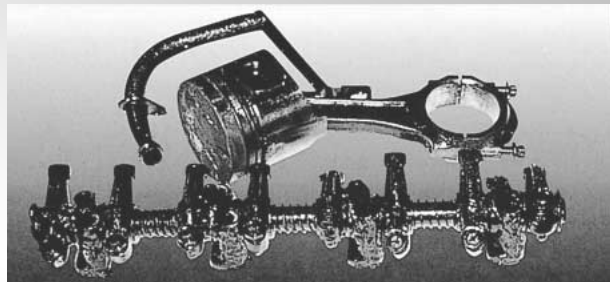
Engine oil has limited life – after a certain point it starts losing lubricating qualities and carbonizes. Once it happens, the engine gets contaminated with carbon deposit or sludge. When you miss your oil change, the engine starts wearing much faster with scuffing engine parts. That's why regular oil changes are so important to keep the engine in a good shape for a long period of time.



Piston damaged by the dirt-contaminated oil

## Engine oil filter

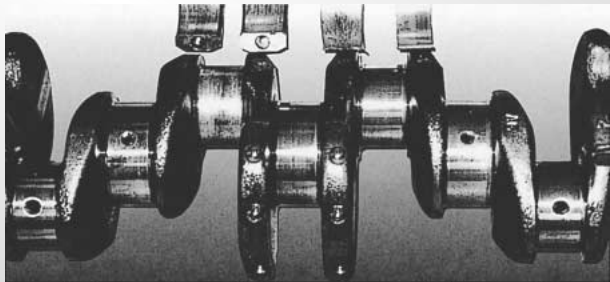
Engine oil filter works to purify sediment of impurities including metal particles and carbon or sludge contained in the oil. But once carbon deposits start clogging the oil pick-up screen decreasing oil supply and increasing friction. At the same time, the oil failed to purify can bypass filter flowing direct to cause wearing and scuffing bearing and crankshaft.



Scuffing bearing



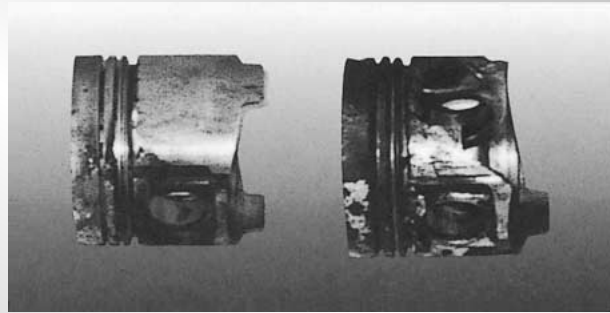
Clogging oil filter



Abrasive wear of crankshaft

## Air cleaner

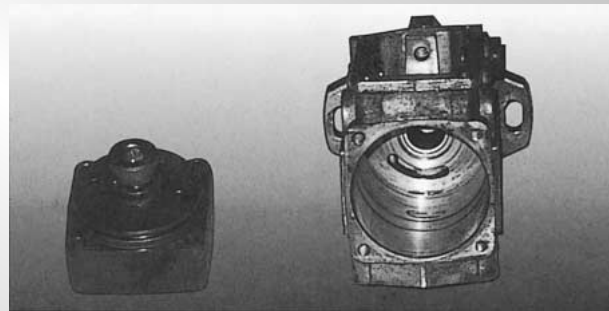
Abrasive wear of piston, piston ring and cylinder liner can be seen after inhaling dirt inside the engine due to damaged element, which eventually may cause decreasing compression and loss of engine power. Moreover, the engine burns out faster by leaking oil from the scuffing space, which may cause increased fuel consumption.



Wearing out of piston contaminated by dirt

## Fuel filter

The plunger of fuel injection pump is precisely fitted to the barrel with very small clearance to form a perfect sealing and moves hard following to engine rotation. If the dirt-contaminated fuel enters the precision clearance, the plunger can be damaged and down. The fuel filter is a very important part straining impurities to avoid such troubles.



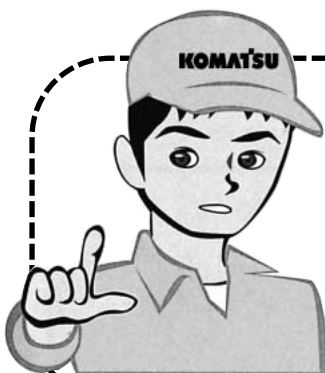
Scuffing plunger of fuel injection pump

## Hydraulic oil

Movement of mast and forks of forklift is controlled by high-pressured hydraulic oil. If the hydraulic oil is mixed with impurities or dirt, piston cylinder can be damaged, which may cause oil leaking and eventually loss of engine power. The worn-out hydraulic oil is also useless with no necessary pressure available.

## Transmission oil

In the power train, the oil is circulating between torque converter, transmission and control valves. These components have been processed very precisely to prevent them from getting impurities or dirt. The lack of oil or using worn-out oil may cause severe damage to clutch plate or lining.



## Few tips on selecting right oil:

Are you always choosing to use only appropriate engine oil type?

The two types of engine oil is available for diesel engine models: one for general use and the other for winter with the viscosity rating to assure the oil will always be able to flow through the engine's lubrication system. If you select the oil for general use in a low temperature, lubrication will not be available and may cause to damage the engine.

# Periodic Maintenance Schedule of Engine Oil and Oil Filter

1		Engine oil	Oil filter
First maintenance of new forklift (First one month or 200 hours inspection and maintenance)	IC engine-powered forklift	<ul style="list-style-type: none"> <li>• Change oil of engine oil pan.</li> <li>• Change oil of hydraulic oil tank</li> <li>• Change oil of torqflow transmission.</li> <li>• Change oil of differential case (including transmission case for clutch model)</li> </ul>	<ul style="list-style-type: none"> <li>• Change cartridge of engine oil filter.</li> <li>• Change line filter of hydraulic oil tank.</li> </ul>
	Electric-powered forklift	<ul style="list-style-type: none"> <li>• Change oil of hydraulic oil tank</li> <li>• Change oil of transfer case (including differential case)</li> </ul>	<ul style="list-style-type: none"> <li>• Change line filter of hydraulic oil tank.</li> </ul>

2		Engine oil	Oil filter
Every one month or 200 hours inspection and maintenance	IC engine-powered forklift	<ul style="list-style-type: none"> <li>• Change oil of engine oil pan (including differential case).</li> <li>• Check torqflow transmission case for oil level and refill oil, if necessary.</li> </ul>	None
	Electric-powered forklift	None	None

3		Engine oil	Oil filter
Every 3 months or 600 hours inspection and maintenance	IC engine-powered forklift	<ul style="list-style-type: none"> <li>• Check transmission case for oil level and refill oil, if necessary. (including differential case for clutch model)</li> <li>• Check differential case for oil level and refill oil, if necessary. (including transmission case for clutch model)</li> </ul>	<ul style="list-style-type: none"> <li>• Change cartridge of engine oil filter.</li> <li>• Change cartridge of fuel filter. (for diesel engine-powered model)</li> </ul>
	Electric-powered forklift	None	None

4		Engine oil	Oil filter
Every 6 months or 1200 hours inspection and maintenance	IC engine-powered forklift	<ul style="list-style-type: none"> <li>• Change oil of hydraulic oil tank</li> <li>• Change clutch oil (for clutch model).</li> <li>• Change brake oil.</li> <li>• Change oil of torqflow transmission case.</li> <li>• Change oil of differential case (including transmission case for clutch model).</li> </ul>	<ul style="list-style-type: none"> <li>• Change element of air cleaner.</li> <li>• Change element of fuel filter. (for gasoline engine-powered forklift)</li> <li>• Change line filter of hydraulic oil tank.</li> <li>• Change strainer of torque converter case.</li> </ul>
	Electric-powered forklift	<ul style="list-style-type: none"> <li>• Change oil of hydraulic oil tank</li> <li>• Change oil of transfer case (including differential case).</li> </ul>	<ul style="list-style-type: none"> <li>• Change line filter of torque converter case.</li> </ul>

## Few tips on engine lubrication:

